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ABSTRACT

This study investigated the possible contribution of pictures serving a representation function to the recall and retention of information presented in written prose passages. The primary variable considered was the durability of picture effects; a second variable concerned the potential effect the presence of pictures had on the recall of information that was not pictured. Thirty graduate students from a southeastern university were randomly assigned to one of two groups--prose-plus-picture (N=16), and prose-only (N=14). In the prose-plus-picture group, subjects read the prose passage and viewed a representational picture (line drawing). In the prose-only group, the participants read the prose passage without the relevant picture. Participants were tested in a group format; when a subject completed reading one passage, a 10-item test for that passage was administered; the same procedure was used for two subsequent passages. Fifty-five days later the subjects were tested again without rereading the stimulus material. Results indicated that subjects' average recall in the prose-plus-picture was 11%-15% higher than that of subjects in the prose-only condition. Although the presence of pictures moderately facilitated the recall of information which was presented only in the prose passage for the immediate testing condition, this facilitation was not significantly greater for the prose-plus-picture condition. In addition, the presence of pictures neither facilitated nor hindered recall of information which was presented only in the prose passage. A nine-item list of references, one data table, and a sample illustration complete the document. (JB)

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Effect of Pictures on Recall of Written Prose: How Durable are Picture Effects?

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Abstract

There is now substantial evidence that pictures can be used to facilitate the recall of information presented in prose passages. There is also evidence that the presence of pictures in prose passages does not hinder the recall of information that is not pictured. Are the picture effects durable over longer periods (55 days) of time? Do pictures included in prose passages help or hinder subjects recall of information that is not pictured? Results of this study provide evidence that picture effects are durable. In addition, the inclusion of pictures in prose passages did not interfere with the recall of information presented only in the prose passage.

Effects of Pictures on Recall of Written Prose: How Durable are Picture Effects?

Results from prose learning studies examining the contribution of pictures to the recall of prose materials provide considerable empirical evidence that pictures can be used to facilitate the recall of information presented in prose passages (Alesandrini, 1984; Levie & Lentz, 1982; Levin, 1981; Levin & Lesgold, 1978). In an integrative review of research on the effects of text illustrations, Levie and Lentz (1982) report that "the results of 46 comparisons of learning illustrated text information from passages with and without pictures reveal an overwhelming advantage for the inclusion of pictures" (p. 203).

Levin (1981) has provided a theoretical framework which distinguishes between seven functions that prose-relevant-pictures may serve. The seven functions identified by Levin include: decoration, remuneration, motivation, reiteration, representation, organization, interpretation, and transformation. According to Levin (1981), "Two of these functions (the representation function and the transformation function) have proved useful in differentiating between the magnitude and

consistency of picture effects that can be anticipated from one prose-learning study to the next" (pp. 225-226). The function of a representational picture would be to make the information in the prose passage more concrete. Levin (1981) suggests that the contribution of representational pictures to improved prose learning would be moderate. Pictures serving a transformation function would make the information in the prose passages more memorable. The predicted prose learning improvement using pictures serving a transformation function would be substantial (Levin, 1981).

This study investigated the possible contribution of pictures serving a representation function to the recall and retention of information presented in written prose passages. The primary variable considered in this study was the durability of picture effects. Peng and Levin (1979) pointed out that "in order to prove implications for classroom-learning situations, it must be demonstrated that gains attributable to pictures are not short-lived" (p. 39). Kerst and Levin (1973) have demonstrated the durability of picture effects using a paired-associate learning tasks with children as

subjects. Using a more ecologically valid story-recall task, Peng and Levin (1979) reported that picture effects found with second graders were durable over a 3-day period. Levin and Berry (1980) also found picture effects to be durable over a 3-day period. Using representational pictures, Anglin (in press) reported significant picture effects which were durable over 14 and 26 days. Based on the results of studies by Peng and Levin (1979), Levin and Berry (1980), and Anglin (in press), it was hypothesized for the current study that representational picture effects would be durable over a 55-day delay. It was also predicted that the magnitude of the picture effects would be moderate based on Levin's (1981) theoretical discussion of potential picture functions.

A secondary variable considered in this study concerned the potential effect the presence of pictures had on the recall of information that was not pictured. Based on the results of 10 studies, Levie and Lentz (1982) concluded that "illustrations have no effect on learning non-illustrated text information" (p. 203). A closer examination of the 10 studies reveals that subjects for 7 of the 10 studies were children in grades

K-6. The three studies including older learners used cartoons as the illustrations. Can the lack of picture facilitation or interference found with young children be extended to older learners (college students) if the illustrations are text-redundant pictures instead of cartoon embellishments? It was hypothesized that the presence of pictures would neither facilitate or hinder subjects recall of information which was presented only in the passage and not pictured.

This study investigated the limits of durability for significant picture effects. The durability of picture effects was examined over a 55 day period. In addition, the effects of pictures on the recall of information presented in the text only was examined.

Method

Subjects and Design

Subjects were 30 graduate students from a southeastern university. The participants were randomly assigned to one of two groups--prose-plus-picture (16 subjects) and prose-only (14 subjects). In the prose-plus-picture group, subjects read the prose passage and viewed a representational picture (line

drawing). In the prose-only group the participants read the prose passage without the relevant picture.

Materials

The three prose passages used by Anglin (in press) were also used in the current study. The passages were human interest stories which varied in length from one-half to three quarters of a page, typed, and double-spaced. The passages were selected from Time, a weekly news magazine. Topics discussed in each of the three passages concerned skateboarding, Santa Claus and Christmas, and an individuals attempt to set up residence on a traffic island on Manhattan.

The same line drawings used by Anglin (in press) were used in the current study (one drawing per passage). The drawings were designed to function as representational pictures, i.e. pictures whose function is that of making the prose passage more concrete (Levin, 1981). An example of the picture used for the traffic island passage is presented in Figure 1.

Insert Figure 1 about here

The 15 paraphrase questions (5 per passage) used by Anglin (in press) were also used in this study. The 15 questions tested recall of information (text-redundant) that was presented in the prose passage and represented in the picture. An example of one of the Text-redundant Test items for the traffic island passage follows:

On what object or structure did the man set up residence?

Five additional short-answer paraphrase questions were constructed for each of the three passages (5 items per passage). The 15 new items were designed to test the recall of information which was presented in the prose passage that was not represented in the accompanying picture. An example of one the the Text-only Test items for the traffic island passage follows:

Where was the man finally taken?

It was previously demonstrated that subjects could not correctly answer the 15 questions which tested the recall of information which was presented in the passage and represented in the picture without reading the prose passage and/or viewing the picture (Anglin, in press). Prior to the administration of the current experiment,

the 15 new paraphrase questions designed to test for recall of information presented in the text but not represented in the pictures were administered to a group of 12 graduate students to verify that these new questions could not be correctly answered by individuals who had not previously received any treatment. Average recall for the 12 graduate students was 2%.

Procedure

Subjects were tested in a group format. In both the prose-plus-picture and prose-only groups, subjects were instructed to read the prose passage once. In the prose-plus-picture condition, subjects were also instructed to view the accompanying picture. The passage orders were counter-balanced across subjects. When a subject completed reading one passage the 10 item test for that passage was administered. The same procedure was used for passages two and three. Fifty-five days later, the subjects were tested in the same manner using the same 30-item test (10 items per passage) used in the immediate condition. In the delayed testing condition subjects did not re-read the stimulus materials.

Results

The analyses were performed in two stages. The first analysis examined the possible effect that Treatment and Time of Test had on prose recall scores for the dependent variable Text-Redundant Test score. The second analysis also examined the effect that Treatment and Time of test had on prose recall for the dependent variable Text-only Test score

The first analysis was a 2 (Treatment) x 2 (Time of Test) repeated measures analysis of variance (ANOVA) using each subjects' prose recall score for the Text-redundant Test as the dependent variable. Treatment (prose-plus-picture, prose-only) was the between-subjects factor, while Time of Test was the within-subjects factor. Cell means and standard deviations from this analysis are presented in Table 1. The ANOVA yielded significant main effects for: Treatment, $F(1, 28) = 9.36$, $p < .01$; Time of Test, $F(1, 28) = 98.92$, $p < .001$. The two-way interaction: Treatment by Time of Test was not significant, $F(1,28) = .22$, $p > .05$

Insert Table 1 about here

The marginal means for Treatment indicated that subjects' average recall was greater in the prose-plus-picture condition ($\underline{M}$ = 10.38) than in the prose-only condition ($\underline{M}$ = 8.45). Marginal means for the within-subjects factor Time of Test indicated that subjects average recall was greater in the immediate ($\underline{M}$ = 12.30) than in the delayed ($\underline{M}$ = 6.40) testing condition. Given the hypothesis of durable picture effects, tests of simple main effects (Dixon, 1983) were performed to directly compare the prose-plus-picture group with the prose-only group for the immediate and delayed testing conditions. Average recall for prose-plus picture subjects ($\underline{M}$ = 13.18) was significantly higher ($\underline{p} < .05$) than average recall for prose-only subjects ($\underline{M}$ = 11.53) in the immediate testing condition. In the 55-day delayed testing condition, the average recall of prose-plus-picture subjects ($\underline{M}$ = 7.57) was also significantly higher than that of prose-only subjects ($\underline{M}$ = 5.38) with $p < .05$.

The second analysis was a 2 (Treatment) x 2 (Time of Test) repeated measures analysis of variance using each subjects' prose recall score for the Text-only Test as the dependent variable. The 15 items in the Text-only Test were designed to measure the recall of information presented in the text but not represented in the pictures. Treatment (prose-plus-picture, prose-only) was the between subjects factor; Time of Test was the within-subjects factor. Cell means and standard deviations from the second analysis are presented in Table 1. The ANOVA yielded a significant main effect for Time of Test, $F(1,28) = 241.69$, $p < .001$. The main effect Treatment was not significant, $F(1,28) = .32$, $p > .05$. The two-way interaction: Treatment by Time of Test was not significant, $F(1,28) = 1.30$, $p > .05$. The marginal means for the within-subjects factor Time of Test indicated that subjects average recall was greater in the immediate ($M = 11.90$) than in the delayed ($M = 4.52$) testing condition.

Discussion

The two variables considered in this study were: a) durability of picture effects, and b) the potential

effect the presence of pictures had on recall of information that was not pictured. The discussion concerning the durability of picture effects is based on the first analysis which included Text-redundant Test score as the dependent variable. The discussion of whether the presence of pictures facilitate or hinder subjects' recall of prose information that is not pictured is based on the second analysis. Text-only Test score was the dependent variable for the second analysis.

With respect to the first and primary variable of the study (text-redundant information), the analysis indicated that picture effects were present and durable over time (55 days). Subjects who were in the prose-plus-picture condition remembered significantly more information that was presented in the passages and represented in the pictures than those subjects who received the prose-only treatment in both the immediate and delayed (55 days) testing conditions (Text-redundant Test). Both treatment groups' average recall was significantly lower in the delayed testing condition. The results of the analysis provide evidence that

picture effects are durable over at least a 55-day delay.

A theoretical explanation of higher recall scores in prose-plus-picture (representational pictures) conditions has been suggested by Levin (1981). Levin argues that representational pictures produce a memory trace which is more robust than that associated with a verbal representation of the text. The more robust trace would have benefits during initial storage of the information in the passage as well as later retrieval of the passage information. Representational pictures make the information in the prose passages more specific and provide a second mode for the information to be represented in the brain (Levin, 1981).

Subjects' average recall in the prose-plus-picture condition was 11% - 15% higher than that of subjects in the prose only-condition. The magnitude of the picture effects in both the immediate and delayed (55 days) testing conditions are similar to those identified by Anglin (in press). Using younger children as subjects, Levin and Berry (1980) and Peng and Levin (1979) also identified similar average picture facilitation which

ranged from 13% - 20% higher for prose-plus-picture groups than prose-only groups.

The second variable considered in this study was the potential effect the presence of pictures had on the recall of information presented in prose passages which was not represented in pictures. The presence of pictures facilitated moderately the recall (Text-only Test) of information which was presented only in the prose passage for the immediate testing condition. However, this facilitation was not significantly greater for the prose-plus-picture condition. The second analysis indicated that the presence of pictures did not significantly facilitate or hinder recall of information which was presented only in the prose passage. The average recall of information for subjects in the prose-plus-picture condition did not differ significantly with that of subjects in the prose-only condition. However, subjects' average recall was significantly lower for both treatment groups on the delayed testing condition.

In summary, the limits of the durability of picture effects was extended from 26 days to 55 days. Results of this study also support the claim that the presence

of representational pictures in prose passages does not significantly facilitate or hinder the recall of information in prose passages that is not pictured. Further extension of the limits of the durability of picture effects is justified. Are picture effects durable across types of prose passages (narratives, human interest, etc.)? Will the magnitude of picture effects be similar across passage types? Will pictures facilitate the recall of information presented in prose passages for adult learners? Results of this study and knowledge of the effects of passage type and audience would provide practical information for individuals concerned with the design of instruction.

References

Alesandrini, K. L. (1984). Pictures and adult learning. Instructional Science, 13, 63-77.

Anglin, G. J. (in press). Prose-relevant pictures and older learners' recall of written prose. Educational Communication and Technology Journal.

Dixon, W. J. (Ed.). (1983). BMDP Statistical Software. Berkley: University of California Press.

Kerst, S., & Levin, J. R. (1973). A comparison of experimenter-provided and subject-generated strategies in children's paired-associate learning. Journal of Educational Psychology, 65, 300-303.

Levie, W. H., & Lentz, R. (1982). Effects of text illustrations: A review of research. Educational Communication and Technology Journal, 30, 195-232.

Levin, J. R. (1981). On functions of pictures in prose. In. F. J. Pirozzolo & M. C. Wittrock (Eds.), Neuropsychological and cognitive processes in reading. New York: Academic Press.

Levin, J. R., & Berry, J. K. (1980). Children's learning of all the news that's fit to picture. Educational Communication and Technology Journal, 28, 177-185.

Levin, J. R., & Lesgold, A. M. (1978). On pictures in prose. Educational Communication and Technology Journal, 26, 233-243.

Peng, C. Y., & Levin, J. R. (1979). Pictures and children's story recall: Some questions of durability. Educational Communication and Technology Journal, 27, 39-44.

Table 1

Means and Standard Deviations of Subjects' Prose Recall Scores by Treatment, Time of Test and Information Tested.

	Treatment	Immediate		Delayed		Marginals	
		M	SD	M	SD	M	SD
Text-redundant Test	Prose-plus-picture	13.18	1.75	7.57	3.51	10.38	3.95
	Prose-only	11.53	2.02	5.38	1.82	8.45	3.66
	Marginals	12.30	2.05	6.40	2.91		
Text-only Test	Prose-plus-picture	12.39	1.08	4.43	3.09	8.41	4.65
	Prose-only	11.47	2.13	4.59	2.26	8.03	4.12
	Marginals	11.90	1.76	4.52	2.63		

Note: Prose Recall scores can range from 0 to 15 for both the test measuring text-redundant information and the test measuring information presented in the text only.

Figure 1. Picture Accompanying One of the Prose Passages in Experimental Condition.